

WHAT IS CLAIMED IS:

1. An HID lamp comprising:
  - a. an outer lamp envelope having an opening at one end;
  - b. an arc tube mounted within said outer lamp envelope, said arc tube having at least one arc tube lead at each end thereof; and
  - c. a mounting structure for supporting said arc tube within said outer lamp envelope and for providing electrical coupling between the arc tube and an electrical power receiving lamp base, said mounting structure comprising:
    - i. a stem assembly mounted at the open end of said lamp envelope, said stem assembly including a stem and first and second stem leads each providing an electrical connection from the interior of the lamp envelope to the exterior of the lamp envelope;
    - ii. an elongated frame weldlessly supported at one end by said stem assembly;
    - iii. a pair of spaced apart reflectors weldlessly supported by said frame, one of said reflectors being supported adjacent said lamp stem, the other of said reflectors being supported adjacent the distal end of said frame;
    - iv. a pair of spaced apart arc tube holders weldlessly supported by said frame between said pair of reflectors, one of said arc tube holders

supporting the end of the arc tube nearer the stem assembly, the other of said arc tube holders supporting the other end of the arc tube;

- v. a first electrical connector electrically coupling the first stem lead to one of said arc tube leads; and
- vi. a second electrical connector electrically coupling the second stem lead to the other of said arc tube leads.

2. The HID lamp of Claim 1 wherein the electrical coupling between the arc tube leads and the stem leads includes no welds.

3. The HID lamp of Claim 1 further comprising an insulator supported from the reflector adjacent said lamp base, said insulator being formed from electrically insulative material and forming one or more apertures suitable for receiving one of said electrical connectors therethrough, said insulator providing electrical insulation between said electrical connector and the reflector.

4. The HID lamp of Claim 3 wherein the insulator is formed from ceramic material.

5. The HID lamp of Claim 4 wherein the insulator forms three apertures.

6. The HID lamp of Claim 1 wherein at least one of said lamp holders comprises a thin element having laterally opposing pairs of peripheral projections, each pair of projections being mechanically deformed around a portion of said elongated frame

to thereby secure the arc tube holder to the frame, and a pair of spaced apart, laterally opposing, cantilevered portions, the space between said portions being dimensioned to receive and retain a pinched end of said arc tube.

7. The HID lamp of Claim 6 wherein the axis formed by said laterally opposing pairs of peripheral projections is substantially parallel to said cantilevered portions.

8. The HID lamp of Claim 6 wherein the axis formed by said laterally opposing pairs of frame peripheral projections is substantially perpendicular to said cantilevered portions.

9. The HID lamp of Claim 1 wherein said reflector adjacent said lamp stem comprises a disc having a planer reflecting surface with an elongated slot therein intermediate a pair of frame retaining tabs for attachment to spaced apart elements of the frame.

10. The HID lamp of Claim 9 further comprising a plural aperture monolithic ceramic insulator disposed within said elongated slot to thereby define separate plural passageways for electrical conductors through said disc.

11. The HID lamp of Claim 9 wherein said reflectors are substantially identical.

12. The HID lamp of Claim 1 wherein said arc tube is axially moveable within a limited range within said outer lamp envelope.

13. In a high intensity discharge lamp including an outer lamp envelope, a disc

shaped reflector supported within the outer lamp envelope near the base of the lamp, and an arc tube supported within the outer envelope, the improvement comprising a second disc shaped reflector mounted near the closed end of the envelope.

14. In a high intensity discharge lamp including an outer lamp envelope, an arc tube, and a mounting structure for laterally and axially supporting the arc tube within the outer lamp envelope, the improvement wherein the mounting structure provides for limited axial movement of the arc tube to thereby reduce mechanical failure of the mounting structure when subjected to mechanical agitation.

15. In a high intensity discharge lamp including an envelope enclosing a lamp stem assembly mounted at the opening at one end of the envelope, a lead providing an electrical path between the stem assembly and an arc tube through a reflector, and means for electrically insulating the lead from the reflector, the improvement wherein said insulating means is an apertured ceramic supported by said reflector.

16. The lamp of Claim 15 including a second lead providing an electrical path between said stem assembly and the arc tube through the reflector, and means for electrically insulating said second lead from said reflector; and

wherein said apertured ceramic is a monolithic structure having at least two spaced apart apertures, one of said leads passing through one of said apertures and the other of said leads passing through the other of said apertures.

17. A structure for mounting a high wattage arc tube within the outer lamp envelope of an HID lamp, said mounting structure comprising an elongated frame supporting a pair of spaced apart arc tube holders along the length thereof, each of said arc tube holders being adapted to support one end of a high wattage arc tube, wherein there being no weld between each of said arc tube holders and said frame.

18. The mounting structure of Claim 17 further comprising a pair of spaced apart reflectors supported by said frame along the length thereof, wherein there being no weld between each of said reflectors and said frame.

19. A structure for mounting an arc tube within the outer lamp envelope of an HID lamp, said mounting structure comprising:

a rigid frame comprising substantially parallel spaced apart elongated legs;

a pair of spaced apart arc tube holders supported by said frame along the length thereof, at least one of said arc tube holders comprising an arc tube retaining portion disposed between a pair of frame retaining tabs, one of said frame retaining tabs receiving a portion of one of said substantially parallel legs therein, the other of said frame retaining tabs receiving a portion of the other of said substantially parallel legs therein, the arc tube retaining portion receiving a portion of one end of a high wattage arc tube therein.

20. The mounting structure of Claim 19 wherein the arc tube retaining portion of at least one of said arc tube holders comprises a pair of spaced apart, laterally opposing

cantilevered portions being dimensioned to receive and retain a pinched end of an arc tube.

21. A structure for mounting an arc tube within the outer lamp envelope of an HID lamp, said mounting structure comprising an elongated frame, a pair of spaced apart reflectors supported by said frame along the length thereof, and an arc tube supported by said frame between said pair of reflectors, wherein there being no weld between each of said reflectors and said frame.

22. A structure for mounting an arc tube within the outer lamp envelope of an HID lamp, said mounting structure comprising:

a rigid frame comprising substantially parallel spaced apart elongated legs;

a pair of spaced apart reflectors supported by said frame along the length thereof, at least one of said reflectors comprising a pair of spaced apart frame retaining tabs, one of said frame retaining tabs receiving a portion of one of said substantially parallel legs therein, the other of said frame retaining tabs receiving a portion of the other of said substantially parallel legs therein.

23. The mounting structure of Claim 22 wherein at least one of said reflectors comprises a portion intermediate said frame retaining tabs forming an aperture.

24. The mounting structure of Claim 23 further comprising an insulator received within said aperture formed by one of said reflectors, said insulator comprising electrically insulative material forming one or more wire guiding apertures, each of said

wire guiding apertures being adapted to receive an electrically conductive wire therethrough to thereby electrically insulate said wire from said reflector.

25. A mounting structure for supporting an arc tube in the outer lamp envelope of an HID lamp, said mounting structure comprising:

- a lamp stem assembly;

- a rigid frame supported by said lamp stem assembly, said frame comprising elongated spaced apart elements;

- a pair of arc tube holders supported by said frame along the length thereof, each of said arc tube holders comprising a thin one-piece metallic element having laterally opposing pairs of peripheral projections, each pair of projections being mechanically deformed around one of said spaced apart frame elements to thereby secure the arc tube holder to the frame, and a pair of spaced apart, laterally opposing, cantilevered portions, the space between said portions being dimensioned to receive and retain a pinched end of an arc tube;

- a pair of reflectors supported by said frame along the length thereof, at least one of said reflectors comprising a thin one-piece metallic disc having a substantially planar reflecting surface with an elongated slot therein and spaced apart laterally opposing pairs of frame retaining elements, each pair of frame retaining elements being mechanically deformed around one of said spaced apart frame elements to thereby secure the reflector to the frame; and

a plural aperture monolithic ceramic insulator disposed within said elongated slot to thereby define separate plural passageways for electrical conductors through said disc.

26. A reflector adapted to be carried by spaced apart elements of the frame of an HID lamp comprising:

a disc having a substantially planer reflecting surface with an elongated slot therein; and

a plural aperture monolithic ceramic insulator disposed within said slot to thereby define separate plural passageways for electrical conductors through said disc.

27. The reflector of Claim 26 wherein said surface includes plural deflectable portions integral therewith for maintaining said insulator within said slot.

28. The reflector of Claim 26 wherein said disc includes opposing lateral portions selectively deformable out of the plane of said surface to thereby cooperate with portions of said disc in the plane of said surface to mechanically secure the reflector to the frame when carried thereby.

29. The reflector of Claim 28 wherein said opposing lateral portions are generally normal to the length of said slot.

30. An arc tube holder for an HID lamp having a frame with spaced apart elements, said holder comprising:

a thin one piece metallic element having laterally opposing pairs of peripheral projections mechanically deformable to secure the element to the frame; and



a pair of spaced apart, laterally opposing, cantilevered portions, the space between said portions being dimensioned to receive and retain a pinched end of an arc tube.

31. The holder of Claim 30 wherein said cantilevered portions are sufficiently resilient to permit limited axial movement of an arc tube when received therebetween, thereby reducing the susceptibility of the lamp to failure due to mechanical shock.

32. A method of mounting an arc tube within the outer lamp envelope of an HID lamp comprising the steps of:

- a. providing an outer lamp envelope having an opening at one end;
- b. providing a stem assembly comprising a stem and first and second stem leads each providing an electrical connection from the interior of the lamp envelope to the exterior of the lamp envelope;
- c. supporting an elongated frame at one end from the stem assembly without a weld;
- d. supporting a pair of spaced apart reflectors from the frame without a weld, one of the reflectors being supported adjacent the lamp stem, the other of the reflectors being supported adjacent the distal end of said frame;
- e. supporting a pair of spaced apart arc tube holders from the frame between the pair of reflectors;
- f. supporting one end of a double ended arc tube from one of the arc tube holders and supporting the other end of the arc tube from the other arc tube holder, the

arc tube having an electrical lead extending from each end thereof;

- g. electrically coupling one of the stem leads to one of the arc tube leads;
- h. electrically coupling the other stem lead to the other arc tube lead; and
- i. mounting a lamp base and the stem assembly at the open end of the outer lamp envelope so that the arc tube is supported within the outer lamp envelope.

33. The method of Claim 32 further comprising the step of providing one or more electrically insulative passages through the reflector adjacent the stem assembly.

34. The method of Claim 33 wherein the step of providing one or more electrically insulative passages through the reflector comprises the steps of forming an aperture in the reflector and mounting an insulator within the aperture, the insulator comprising electrically insulative material forming one or more wire guiding apertures.

35. The method of Claim 34 wherein the steps of electrically coupling the stem leads with the arc tube leads comprises the step of passing one electrically conductive wire through a wire guiding aperture and passing another electrically conductive wire through another wire guiding aperture.

36. The method of Claim 32 wherein the frame comprises substantially parallel elongated legs and the step of supporting a pair of arc tube holders from the frame comprises the steps of inserting a portion of one leg into one tab formed by the holder, inserting a portion of the other leg into another tab formed by the holder, and deforming the tabs to thereby frictionally engage the portions of the legs inserted therein.

37. The method of Claim 32 wherein the frame comprises substantially parallel elongated legs and the step of supporting a pair of reflectors from the frame comprises the steps of inserting a portion of one leg into one a tab formed by the reflector, inserting a portion of the other leg into another tab formed by the reflector, and compressing the tabs to thereby frictionally engage the portions of the legs inserted therein.

38. A method of providing a shock absorbing mount for an arc tube in an HID lamp comprising the steps of:

- a. providing an outer lamp envelope;
- b. mounting an elongated frame within the envelope, the frame having spaced apart elements;
- c. mounting a pair of spaced apart arc tube holders along the length of the frame, the arc tube holders comprising a thin one-piece element having a pair of spaced apart laterally opposing cantilevered portions;
- d. inserting one pinched end of an arc tube into the space between the cantilevered portions of one of the arc tube holders;
- e. inserting the other pinched end of the arc tube into the space between the cantilevered portions of the other arc tube holder to thereby support the arc tube between the arc tube holders, wherein the cantilevered portions are sufficiently resilient to permit limited axial movement of the arc tube supported therebetween to thereby reduce the susceptibility of the lamp to failure induced by mechanical shock.